

(19)

Europäisches Patentamt  
European Patent Office  
Office européen des brevets



(11)

**EP 1 340 630 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
03.09.2003 Bulletin 2003/36

(51) Int Cl.7: **B60C 23/04**(21) Application number: **02425117.5**(22) Date of filing: **01.03.2002**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE TR**  
Designated Extension States:  
**AL LT LV MK RO SI**

(72) Inventor: **Leo, Leonardo Claudio**  
**25065 Lumezzane (Brescia) (IT)**

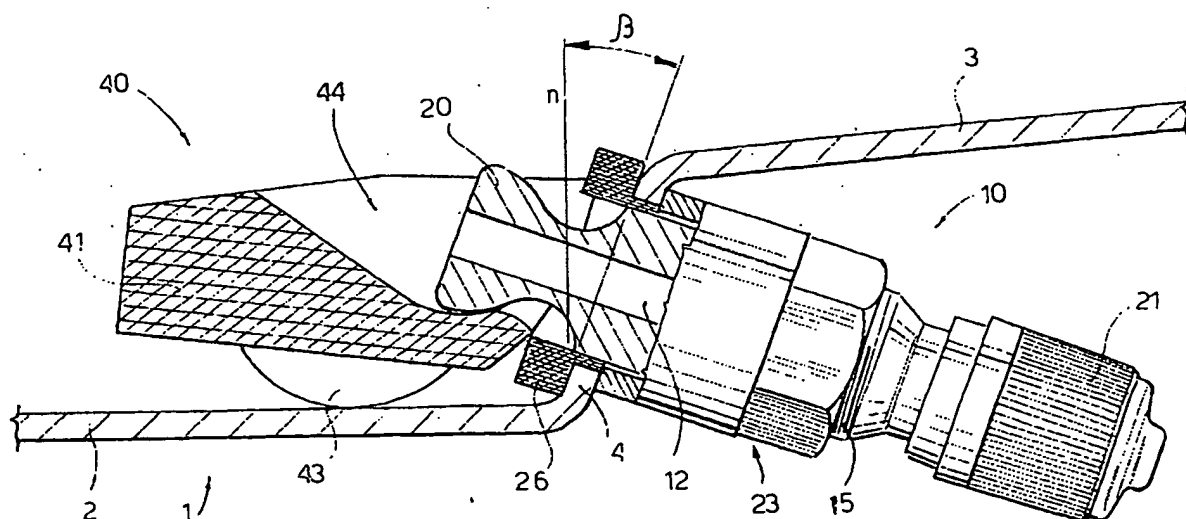
(74) Representative: **Petruzzello, Aldo**  
**Rachelli & C. s.r.l.**  
**Viale San Michele del Carso, 4**  
**20144 Milano (IT)**

(71) Applicant: **BRIDGEPORT BRASS S.P.A.**  
**I-24036 Ponte San Pietro, (Bergamo) (IT)**

**(54) Connection system between valve and sensor for vehicle tyres**

(57) A connection system between valve and sensor for vehicle tyres is described comprising a valve (10) fitted in a hole (5) of the bead (1) of the rim of the wheel and a sensor (40) connected to the valve (10) and positioned inside the chamber formed between the bead and the tyre to read parameters of the tyre and in conformity transmit electric signals to a receiver positioned outside the tyre chamber. The valve comprises a tail (18)

positioned inside the chamber of the tyre and a head (16) fitted outside the chamber to receive an air supply nozzle. The tail (18) of the valve (10) is substantially spherical and engages, in spherical fit relation, in a substantially spherical slot (44) provided in the sensor in order to hold the sensor and allow its self-positioning on the rim bead (1) inside the tyre chamber. The valve (10) comprises locking means (23) positioned outside the tyre chamber to act as a check against the rim bead.

**FIG. 2A****EP 1 340 630 A1**

of the tail 18 of the valve body projects from the hole 46 of the front surface 42 of the sensor body.

[0034] As the walls which define the slot 44 of the sensor body are substantially spherical or rounded and the external surface of the tapered part 20 of the head of the valve body is also substantially spherical or rounded, a spherical fit is defined between the valve 10 and the sensor 40. That is to say, the sensor 40 is free to rotate around the spherical surface of the tail 18 of the valve 10, in a relation of spherical fit.

[0035] Assembly of the assembly composed of the valve 10 and sensor 40 is described below.

[0036] The head part 16 of the valve body 11 is inserted into the hole 5 of the inclined wall 4 of the rim bead 1. In this way the head 16 and the central part 14 of the valve body project behind the bead 1 to be accessible to the user and the sensor 40 is set on the part of the bead 1 facing the inner chamber of the tyre.

[0037] At this point the user screws the threaded ring nut 23 to the central part 14 of the body. As the ring nut 23 is tightened, the annular edge of the ring nut 23 abuts against the edge of the inclined wall 4 of the bead around the hole 5, drawing the valve body 11 towards it. Consequently the disc with the smaller diameter 28 of the gasket 26 enters the hole 5, the contact surface 30 of the gasket 26 abuts against the part of the inclined wall 4 around the hole 5, and the front surface 42 of the sensor abuts against the disc with the larger diameter 27 of the gasket 26.

[0038] In this way, the gasket 26 guarantees the air seal around the hole 5. Instead, the sensor 40 self-positions itself on the recessed part 2 of the bead 1 and at the same time is locked in position abutting against the gasket 26.

[0039] Fig. 2 A shows a bead with an inclined part 4 with an angle of inclination  $\beta$  differing from the angle  $\alpha$  in the example in Fig. 2. In this case, thanks to spherical fit between the tail 18 of the valve 10 and the slot 44 of the sensor 40 and thanks to the discoid feet 43 of the sensor, the sensor adapts perfectly to the configuration of the bead 1.

[0040] Fig. 7 shows a variant, in which between the gasket 26 and the edge of the sensor 40 a washer 50 is interposed fitted around the valve body 11. For this purpose the part of the valve body 11 fitted inside the rim is appropriately extended to receive the washer 50. The washer 50 may be produced in metal material, such as aluminium.

[0041] The washer 50 has an axial through hole 52 through which the body 11 of the valve may pass. On the external surface of the part of the body 11 inside the rim an annular groove is provided suitable to receive a gasket 54, such as an O-ring, interposed between the body 11 and the washer 50 to guarantee correct seal of the washer.

[0042] The washer 50 has a flat lower surface 51 that abuts against the top surface of the gasket 26.

[0043] In the example in Fig. 7 the external edge part

of the sensor around the slot 44 is substantially convex. Consequently the washer 50 has a substantially concave top surface 53 to engage, in spherical fit relation, with the external edge part of the sensor 40.

[0044] Fig. 7A shows an example in which the external edge portion of the sensor around the slot 44 has a substantially concave configuration. In this case to adapt the external edge of the sensor, the washer 50 has a substantially convex top surface 53', in the shape of a spherical cap, to coupling, in spherical fit relation, with the external edge portion of the sensor 40.

[0045] The fitting of the washer 50 allows perfect connection of the valve with the sensor and allows the valve to be adapted to sensors with different configurations.

Moreover, the washer 50 allows correct compression of the gasket 26 on the entire contact surface between washer and gasket.

[0046] Numerous variations and modifications to details apparent to those skilled in the art, may be made to the present embodiments of the invention, without however departing from the scope of the invention set forth in the appended claims.

## Claims

1. Connection system between valve and sensor for vehicle tyres comprising:

- a valve (10) fitted in a hole (5) of the bead (1) of the wheel rim, said valve comprising a substantially cylindrical valve body (11) comprising a tail part (18) positioned inside a chamber formed between the bead and the tyre and a head part (16) positioned outside said chamber to receive an air supply nozzle, and
- a sensor (40) connected to said valve (10) and positioned inside said chamber formed between the bead and the tyre to detect tyre parameters and accordingly transmit electric signals to a receiver positioned outside said tyre chamber,

### characterized in that

said tail part (18) of said valve (10) is substantially spherical and engages, in spherical fit relation, in a substantially spherical slot (44) provided in said sensor in order to hold said sensor and allow its self-positioning on the rim bead (1) inside the tyre chamber, and said valve (10) comprising locking means (23) positioned outside said tyre chamber to act as an abutment against said rim bead.

2. Connection system between valve and sensor as claimed in claim 1, characterized in that said locking means (23) comprise a threaded ring nut with a external diameter larger than the diameter of said hole (5) of the bead (1) to come into contact with

the part of the bead (1) around the hole (5), said threaded ring nut (23) being provided with internal thread (24) which screws into an external thread (15) provided in a central part (14) of said valve body.

3. Connection system between valve and sensor as claimed in claim 2, **characterized in that** said threaded ring nut (23) has a portion of external side surface (25) substantially cut in the shape of a hexagon nut to receive a special tool.
4. Connection system between valve and sensor as claimed in any of the previous claims, **characterized in that** said valve comprises a gasket (26) fitted on the central part of the valve body, said gasket being intended to provide seal around said hole (5) of the rim bead and provide an abutment against said sensor (40).
5. Connection system between valve and sensor as claimed in claim 4, **characterized in that** said gasket (26) has a substantially discoid shape comprising a first disc with a larger diameter (27) with external diameter larger than the diameter of said hole (5) of the rim bead and a second disc with a smaller diameter (28) with external diameter substantially equal to the diameter of said hole (5), said disc with a smaller diameter being fitted around the edges of the hole (5) and said disc with a larger diameter being positioned inside said tyre chamber, abutting against the part of the bead around the hole (5) and against the front surface of said sensor (40).
6. Connection system between valve and sensor as claimed in claim 4 or 5, **characterized in that** a washer (50) is provided around the valve body, interposed between said gasket (26) and the external edge of the sensor (40), said washer (50) guaranteeing perfect coupling with the edge of the sensor and at the same time allowing even compression of the gasket (26).
7. Connection system between valve and sensor as claimed in claim 6, **characterized in that** said washer (50) has a substantially flat bottom surface (51) to come into contact with the surface of the gasket (26) and a substantially concave top surface (53) to engage in relation to spherical fit with a substantially convex external edge portion of said sensor.
8. Connection system between valve and sensor as claimed in claim 6, **characterized in that** said washer has a substantially flat bottom surface (51) to come into contact with the surface of the gasket (26) and a substantially convex top surface (53) to engage in spherical fit relation with a substantially

concave external edge portion of said sensor.

9. Connection system between valve and sensor as claimed in any of the previous claims, **characterized in that** said sensor (40) has a substantially rectangular body (41), supported by two feet (43), substantially discoid, said feet (40) have a rounded resting part to adapt to the configuration of the rim bead inside the tyre chamber.
10. Connection system between valve and sensor as claimed in claim 9, **characterized in that** said feet (43) of the sensor (40) are elastic in order to yield elastically so as to adapt to the configuration of the rim bead inside the tyre chamber.
11. Connection system between valve and sensor as claimed in any of the previous claims, **characterized in that** said slot (44) of the sensor is defined by a first hole, substantially elliptical (45), on the top surface (48) of the sensor body communicating with a second substantially circular hole (46) on the front surface (42) of the sensor and by a narrower part (47) of the sensor body provided between said first hole (45) and said second hole (46).

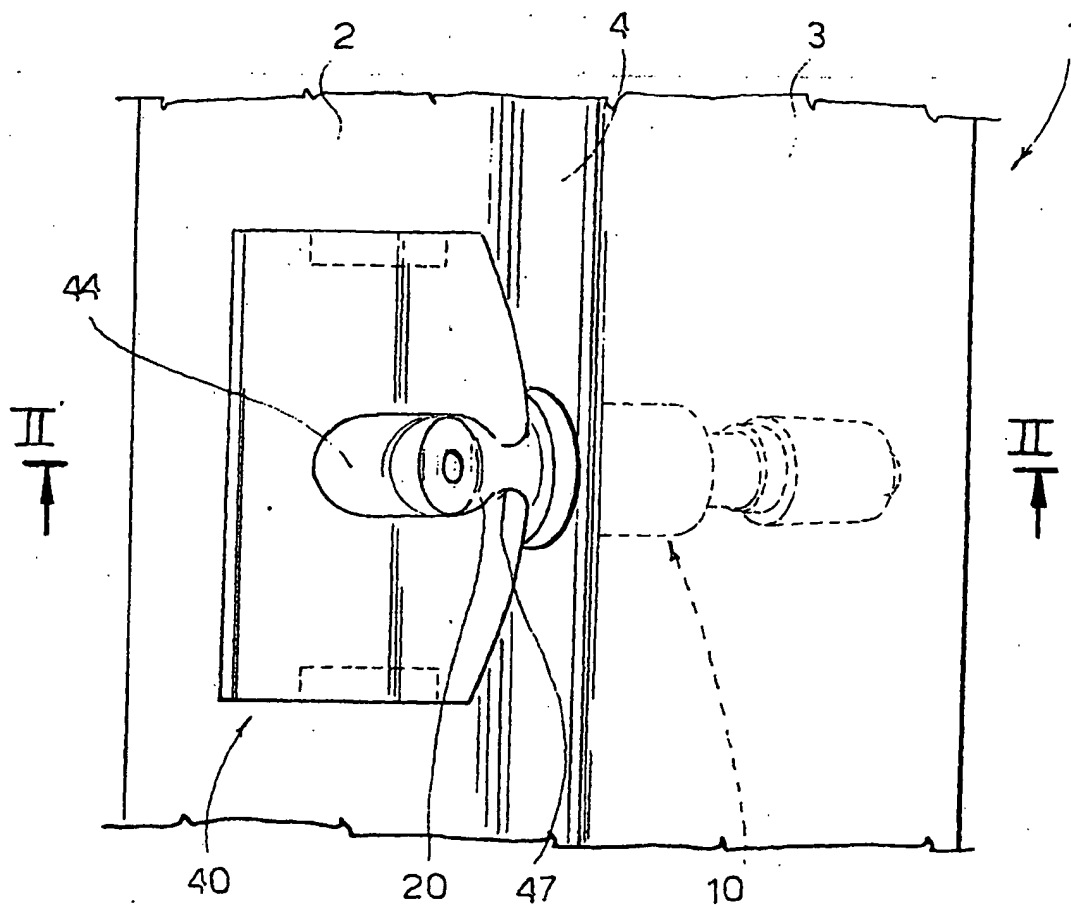


FIG. 1

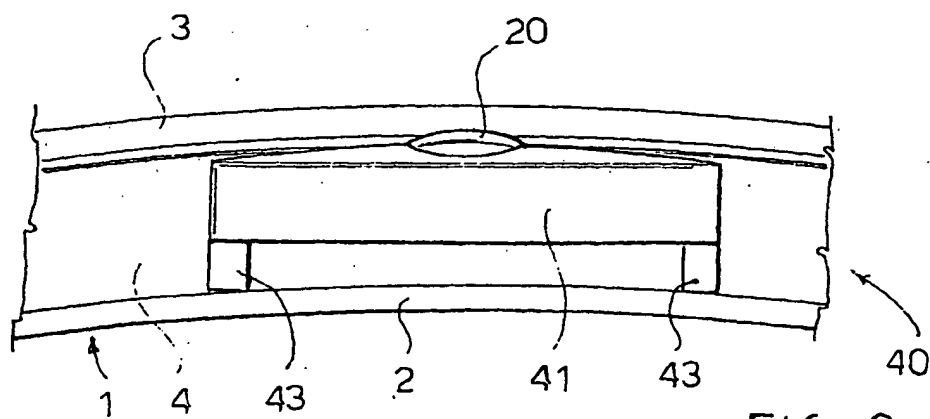


FIG. 3

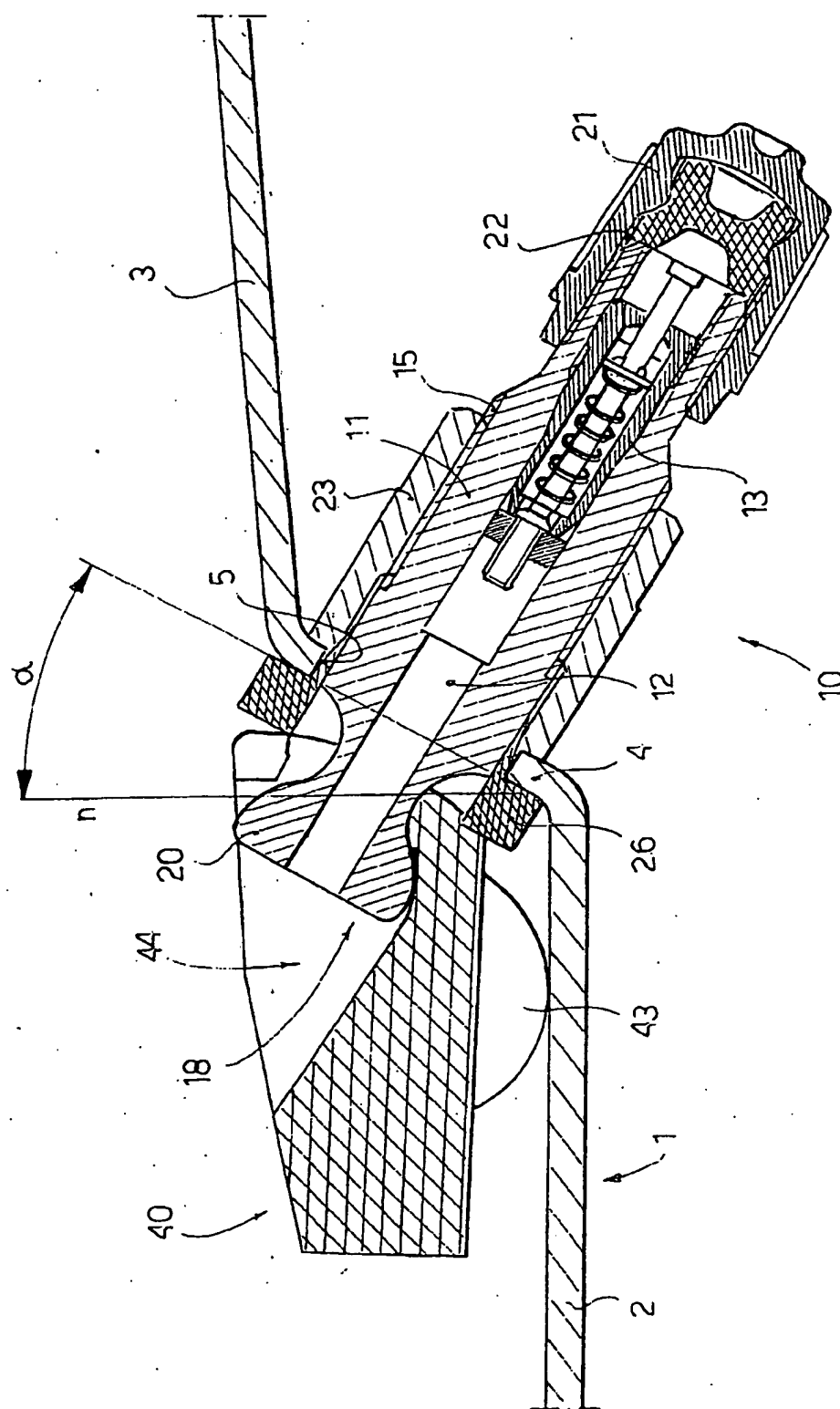


FIG. 2

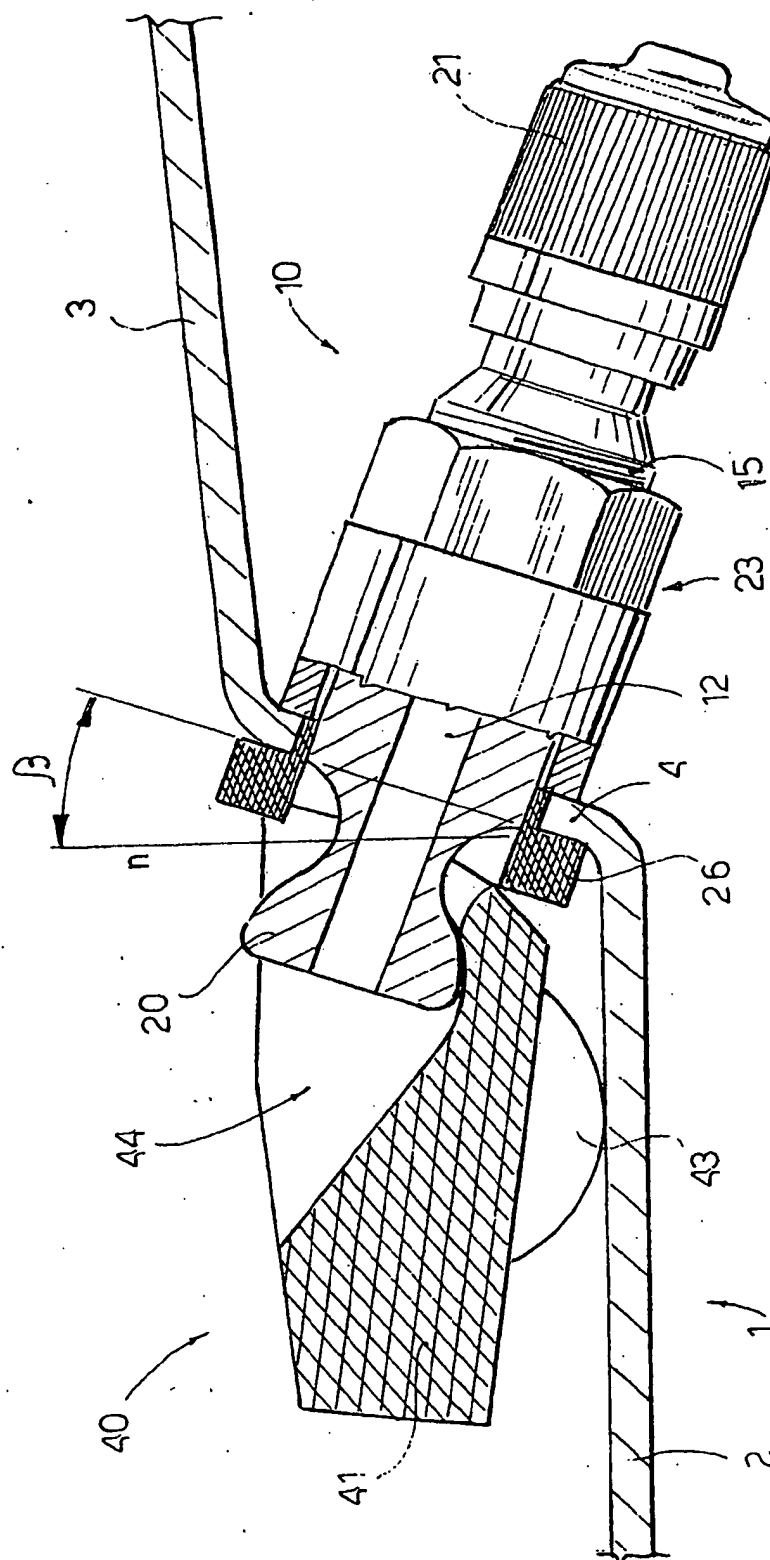
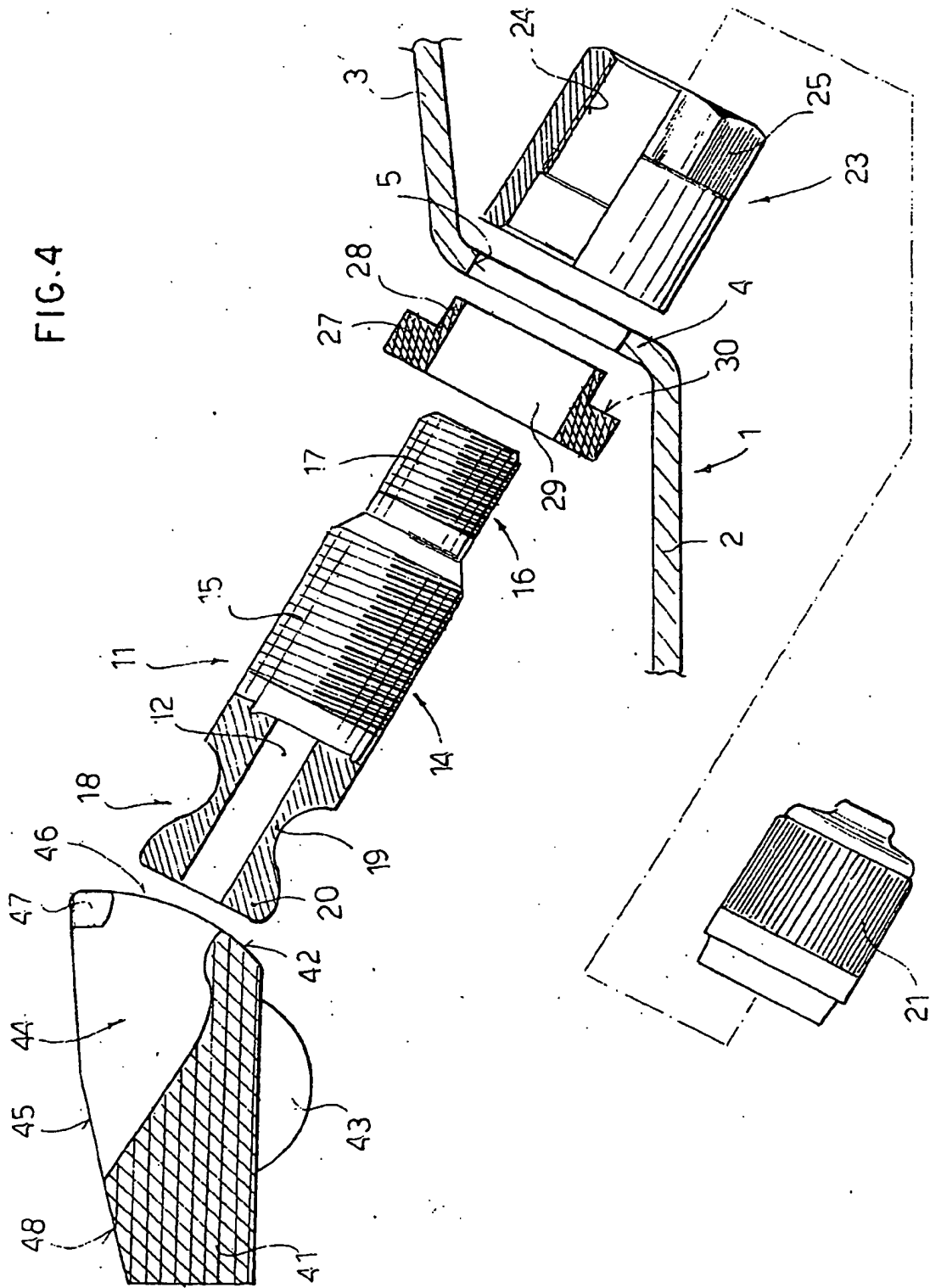


FIG. 2A

FIG. 4



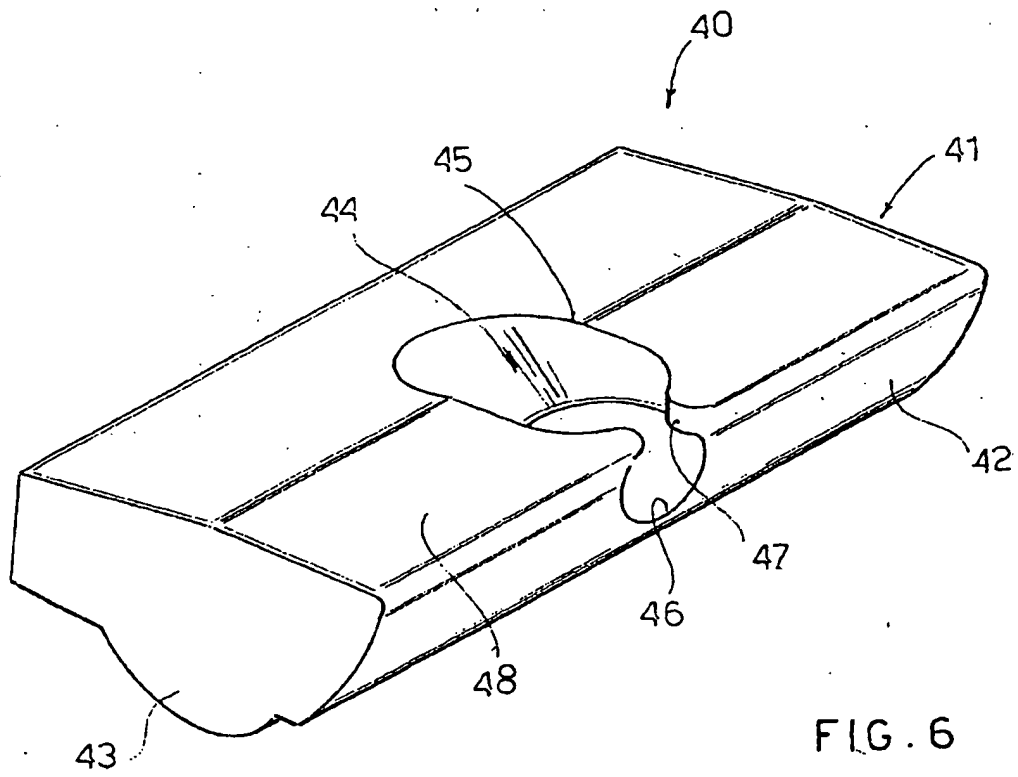
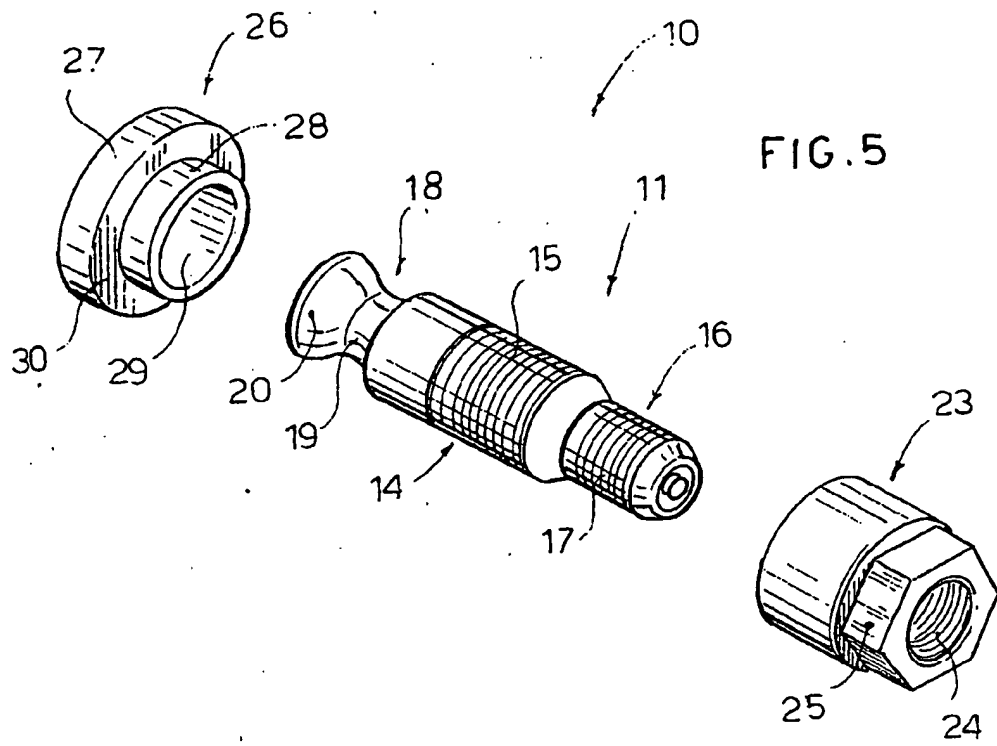




FIG. 7

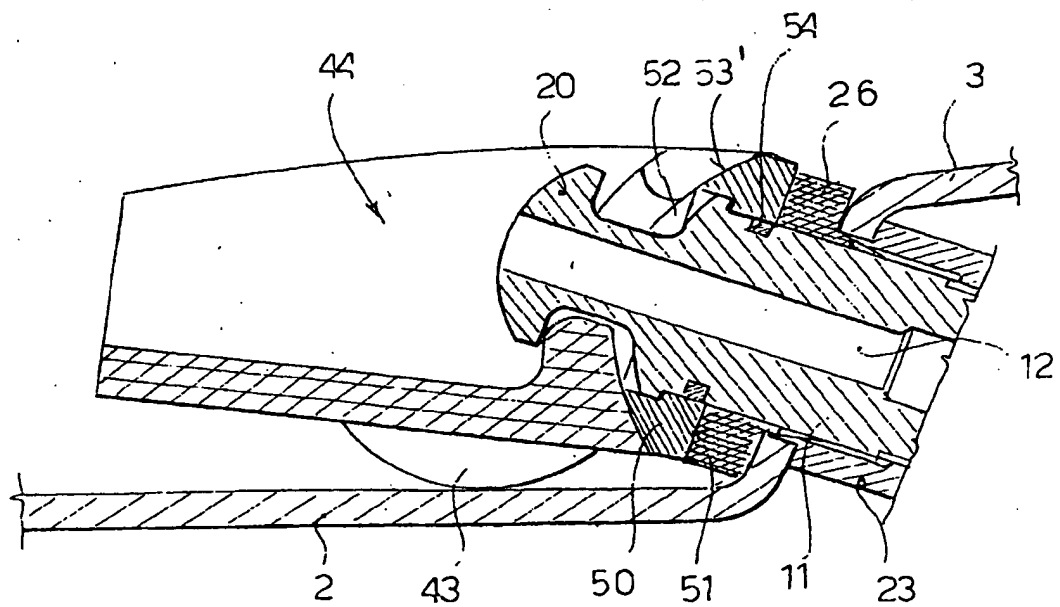
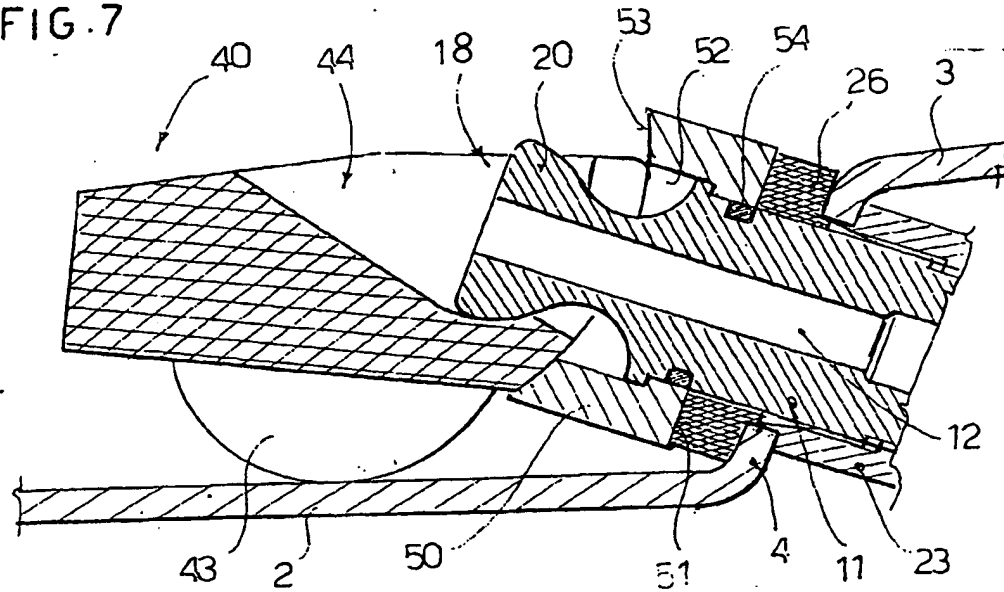


FIG. 7A



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 02 42 5117

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,X	EP 0 751 017 A (ALLIGATOR VENTILFAB GMBH) 2 January 1997 (1997-01-02) * column 2, line 44 - line 54 * * column 5, line 10 - column 6, line 38 * * claims 5,8,16 * * figures 1-7 *	1-5,9,10	B60C23/04
X	DE 100 47 853 A (ALLIGATOR VENTILFAB GMBH) 28 February 2002 (2002-02-28) * paragraphs '0024!', '0028!', '0030!'-'0032!; figures 6-9 *	1-5,9,10	
X	DE 201 10 759 U (BERU AG) 14 February 2002 (2002-02-14) * page 10, line 7 - page 11, line 23 * * page 12, line 22 - page 13, line 7; figures 1-7,14-18 *	1-5,9	
X	DE 196 10 376 A (CONTINENTAL AG) 18 September 1997 (1997-09-18) * claims; figures *	1-5	
A	EP 0 816 136 A (CONTINENTAL AG) 7 January 1998 (1998-01-07) * claims; figures *	1-5,9	B60C
The present search report has been drawn up for all claims			
Place of search <b>MUNICH</b>		Date of completion of the search <b>12 June 2002</b>	Examiner <b>Peschel, W</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.02 (p04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 42 5117

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-06-2002

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
EP 0751017	A	02-01-1997	DE	19624800 A1	23-01-1997
			DE	29623466 U1	23-07-1998
			DE	59602933 D1	07-10-1999
			EP	0751017 A2	02-01-1997
			ES	2137594 T3	16-12-1999
			US	5844131 A	01-12-1998
DE 10047853	A	28-02-2002	DE	10047853 A1	28-02-2002
			DE	10047852 A1	21-02-2002
DE 20110759	U	14-02-2002	DE	20110759 U1	14-02-2002
DE 19610376	A	18-09-1997	DE	19610376 A1	18-09-1997
EP 0816136	A	07-01-1998	DE	19626145 A1	08-01-1998
			AT	210565 T	15-12-2001
			CA	2208726 A1	01-01-1998
			DE	59705739 D1	24-01-2002
			EP	0816136 A2	07-01-1998
			US	5956820 A	28-09-1999

EPO FORM P459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☒ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**